

1048
B.E. (Electrical and Electronics Engineering)
Sixth Semester
EE-612: Signal and System
(May – 2017)

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Section.

x-x-x

Q.No.1 (i) Define convolution integral and convolution sum.

(ii) Find the fourier transform for the signals (i) $x(t) = \text{sgn}(t)$ (ii) $x(t) = 1$.

(iii) What do you mean by aliasing?

(iv) Find the Laplace transform of $e^{-at}u(t)$?

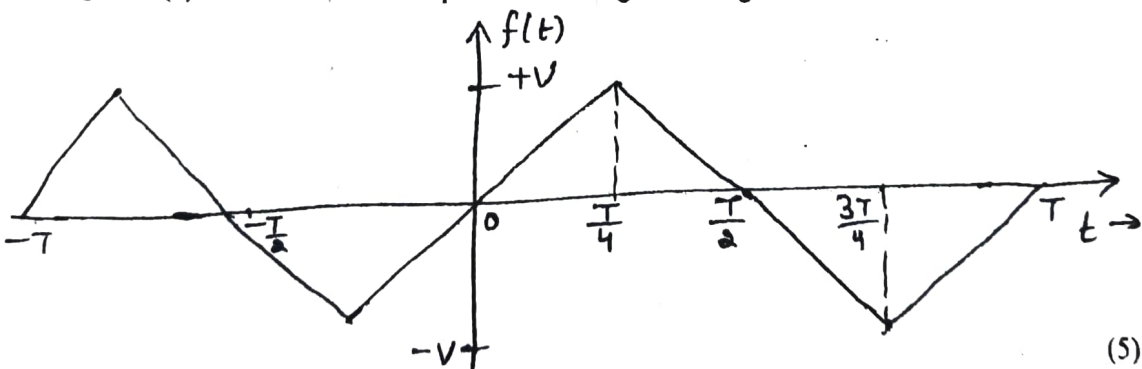
(v) Determine the initial and final values of the discrete time sequence $x(n)$ having its Z-transform $X(z) = 3+5z^{-1}+7z^{-2}$ (5x2=10)

Section – A

Q.No.2 (a) Explain the signals and systems in electrical, thermal and biomedical systems. (5)

(b) An unknown discrete time causal LTI system yields $y(n) = \{1,3,6,10,12,12,10,6,3,1\}$ for input $x(n) = \{1,1,1,1\}$. Identify the system i.e. find $h(n)$ for this system. (5)

Q.No.3 (a) Find fourier series expansion for the given triangular sawtooth waveform:



(b) Find the fourier transform for:

(i) $e^{-at} \cos \omega_0 t u(t)$ (ii) $\text{sgn} t$ (iii) $u(t)$ (5)

Q. No.4 (a) What do you mean by reconstruction using interpolation? (5)

(b) Calculate the fourier series coefficients a_k for the signal $x(n) = \sin \omega_0 n$. (5)

Section-B

Q.No.5 (a) The input $x(n]$ and the output $y(n]$ of a causal stable LTI system are related as:

$$y(n) - \frac{1}{6}y(n-1) - \frac{1}{6}y(n-2) = x(n)$$

(i) Calculate the frequency response $H(e^{j\omega})$.

(ii) Impulse response $h(n]$ of the system.

(5)

(b) State and proof the Parseval's relation for discrete time fourier transform.

(5)

Q.No.6 (a) Find the inverse Z-transform for:

$$(i) X_1(z) = \frac{z}{(z - \frac{1}{2})(z - \frac{1}{4})}, \quad |z| > \frac{1}{2}$$

$$(ii) X_2(z) = \frac{z}{z^2 + z + \frac{1}{2}}$$

(5)

(b) Find the Laplace transform of the following signals and give ROCs:

$$(i) x_1(t) = e^{-3t}u(t) + e^{-2t}u(-t)$$

$$(ii) x_2(t) = e^{2t}u(t) + e^{-3t}u(-t)$$

(5)

Q.No.7 (a) What is Hilbert transform? List the properties of Hilbert transform.

(5)

(b) List down the properties of Z-transform.

(5)